Grand Canyon Wildlife Expedition

Grand Canyon NP
Arizona
National Park Service
U.S. Department of the Interior

A Teacher Guide

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Overview of the Virtual Experience

Preservation and protection of species is a vital role of the National Park Service. The wildlife program of Grand Canyon National Park is undertaking inventory and monitoring projects for several wildlife species in an effort to ensure that these, and many other species, are not lost forever. These inventory and monitoring expeditions provide baseline data to researchers and park staff so they can then make informed management decisions that will ensure the preservation and protection of species.

Students will take a virtual river trip through Grand Canyon National Park to experience the inventory and monitoring effort. The research expedition provides access to remote areas, allows the length of Grand Canyon National Park to be surveyed, and brings together researchers from a variety of fields. Resource managers rely on the data gathered on these expeditions to ascertain valuable information about the health and status of wildlife populations in Grand Canyon National Park. This information allows them to make decisions and plans that can ensure the survival of canyon species.

Canyon Life

The Grand Canyon encompasses a diverse range of habitats. Nearly every habitat of the Southwestern United States, save alpine tundra, is found there. Montane forests cover the canyon rims, and the Mojave Desert habitat can be found in the western reaches of the Grand Canyon. In this section, students will learn why there is such a diverse collection of habitats in the Grand Canyon. They will also learn how these habitats have changed over time, and how humans interact with these habitats.

Logistics

A wildlife research expedition requires more then just a researcher and a boat. A lot of planning is involved to ensure that the expedition is a success. Students will learn about the priorities that are set and the types of research that need to be conducted. They will also learn about the funding, researchers, helpers, the boats, and other supplies that are needed. Students will understand what is involved in planning and conducting a wildlife research expedition.

Research

A typical wildlife river expedition through the Grand Canyon involves many different research studies. Students will be able to explore research topics such as bats, bighorn sheep, river otters, and springs. They can watch video clips of research in action, see interviews with the researchers, and learn how managers can use the data collected to make better management decisions.

Goals

After the expedition is over, and everyone has gone his or her separate way, there is still much to be done. In this section, students will learn more about how the data collected on the trip is analyzed and used to make sound management decisions.

Glossary

Amberat: Urine - covered piles of collected vegetation, bones, sticks and other items that has hardened over time, giving a glossy, hard yellow appearance. Packrats make these and paleoecologists examine them to see what plants and animals were around in the past.

Amphibian: Organisms that can leave the water for extended periods of time, but still are required to return to the water to survive. Frogs, toads, salamanders, and newts are all types of amphibians.

Aquatic: Deals with water. Used to describe anything that lives in the water, or uses water habitats.

Carnivore: An animal that feeds on other animals. Typically mammals such as mountain lions, river otters, and wolves; but can also include snakes and raptors.

DNA: Stands for DeoxyriboNucleic Acid. The chemical blueprints that dictate what an organism is. Typically found in the nucleus of each cell of an organism. Can be used to identify organisms and relationships between organisms.

Ecosystem: A collection of organisms and the natural surroundings they interact with.

Endemic: A species that is confined to a specific place or location. Used to describe rare or endangered species, since their small native range make them susceptible to extinction.

Extirpation: To remove, exterminate, or eradicate for an area. Many of the large predators in Grand Canyon National Park have been lost due to hunting and trapping. The humpback chub are on the verge of being removed because of exotic fish.

Fauna: Term used for animals. Word derived from Roman mythology. Fauna was the sister of Faunus, the God of Animals.

Geomorphology: The studies of landscape features and how they were created.

Habitat: The area an organism uses to live. Includes the area used for foraging food and shelter.

Herbivore: An organism that feeds on plant matter. These include animals like the bighorn sheep, beaver, and many types of insects.

Herpetology: The study of amphibians and reptiles.

Invasive Species: A species that causes harm to communities or ecosystems that it is not a native of. This harm can be ecological, economic, or even a threat to human health.

Invertebrate: A large branch of animals that do not have a spinal column. Some examples of Invertebrates are insects and crustaceans.

Logistics: Term used for the process of gathering, managing, and moving equipment and people.

Mammal: The collection of vertebrate animals that nurse their young with milk.

Midden: Packrats build a protective abode known as a midden. This midden is a fortress of tangled vegetation, bones, sticks and other items that are held together by organic glue, the urine of the packrat.

Montane: Environments found in, or related to, mountainous regions.

Nocturnal: Term used to describe organisms that are active primarily at night. The opposite of this is Diurnal, organisms that are active during the day.

Physiology: The study of the role and function of organisms, or the parts of an organism.

Pleistocene: The period of time ranging from 1.8 million to 11,000 years ago. This is the time period paleoecologists are getting a better understanding about from examining the contents of preserved packrat middens.

Predator: An animal that preys upon other animals for food.

Reptile: Animals that are vertebrates, breath air, and are covered in scales. This includes snakes and lizards.

Researcher: A person who follows the scientific method to answer a question. On these expeditions, researchers are trying to answer questions about the wildlife in the Grand Canyon.

Soil: The interface between rocks and plants. Medium that is made of both organic and inorganic material.

Subsistence: The required items an organism needs in order to survive.

Taxonomy: The classification of life (plants and animals) into groups of related features.

Terrestrial: Deals with land. Organisms that live on land are described as being terrestrial.

Ungulate: The group of mammals that have hooves. Bighorn sheep, elk, deer, and bison are all ungulates.

Vascular Plant: Plants that have conducting systems to transport water and nutrients to cells. The xylem and phloem are parts of the conducting system.

Vertebrate: The branch of animals that have a spinal column. Mammals, reptiles, fish, and birds are all vertebrates.

Volunteer: A person who volunteers their service to helps others without benefit of pay. Volunteers are vital to the success on these research expeditions.

National Teaching Standards

Social Studies Standard 3 - People, Places and Environments
This standard is addressed in the virtual experience because students learn about the Grand Canyon and the wildlife that lives there.

Social Studies Standard 5 - Individuals, Groups and Institutions
This standard is addressed in the virtual experience because students learn about the National Park Service, which is a government agency. Students specifically learn how the National Park Service controls and influences the preservation and protection of wildlife at Grand Canyon National Park.

Social Studies Standard 9 - Global Connections
This standard is addressed in the virtual experience because students understand the tensions between national interests and global priorities, especially relating to the environment (extinction and endangered species).

Science Standard A - Science as Inquiry
This standard is addressed in the virtual experience because students learn about how a group of scientists conduct research studies about the various wildlife in the Grand Canyon.

Science Standard C - Life Science
This standard is addressed in the virtual experience because students learn about the organisms living in the Grand Canyon, specifically animals, and their classification and behavior.

Science Standard E - Science and Technology
This standard is addressed in the virtual experience because students use an interactive computer program to access information on the Grand Canyon.

Activities

Activity - Multiple Choice

Read the question and circle the BEST answer. The information needed to correctly answer the questions is found throughout the virtual experience.

1. Where did this expedition conduct the research?
   a. On the South Rim
   b. On the North Rim
   c. Along the river corridor
   d. In a laboratory
   e. None of the above

2. Why did the expedition go into the Grand Canyon?
   a. To learn about the health and status of certain wildlife species
   b. To record the changes in the ecosystems since the Pleistocene
   c. To conduct rescue and first -aid training
   d. To map the geology of the canyon
   e. All of the above

3. What plays a vital role in adding diversity to life in the Grand Canyon?
   a. Visitor overlooks
   b. Aspect
   c. Burros
   d. Invasive species
   e. None of the above

4. What can be considered the storehouses of past biological history and are found throughout the Grand Canyon?
   a. Burros
   b. Vishnu schist
   c. Agave
   d. Packrat Middens
   e. The Little Colorado River

5. How have humans changed the Grand Canyon?
   a. Introducing invasive species, like rainbow trout
   b. Building dams along the Colorado River
   c. Hunting and trapping species like river otters and wolves
   d. All of the above
   e. None of the above

Activity - Multiple Choice

6. What is needed to running a research expedition?
   a. Research priorities
   b. Funding
   c. Researchers
   d. Volunteers
   e. All of the above

7. How has the bat surveying helped the understanding of bats in Grand Canyon National Park?
   a. Most of the bats have been found to be nectivorous
   b. Most of the bats migrate here for the winter
   c. The number of species known in the park has gone from 9 to 19
   d. There are no bats in the Grand Canyon
   e. All of the above

8. What type of leopard frog has historically lived in the Grand Canyon?
   a. Northern leopard frog
   b. Sonoran leopard frog
   c. Chiricahuan leopard frog
   d. Spotted leopard frog
   e. Mojave leopard frog

9. Why are small mammals important to study?
   a. They are a major vector for invasive species
   b. They are a health threat to visitors
   c. They are eating all of the cactus in the park
   d. They are a major prey base for many of the park's predators
   e. None of the above

10. What are some of the wildlife being studied?
   a. River otters
   b. Mountain lions
   c. Bats
   d. Bighorn sheep
   e. All of the above

Activity - True / False Questions

Read the statement and carefully decide whether the statement in correct and true, or whether the statement is incorrect and false.

1. The expedition helps managers make informed decisions about wildlife
   TRUE FALSE

2. The research expedition could take place without the help of volunteers
   TRUE FALSE

3. Alpine tundra can be found on the North Rim of the Grand Canyon
   TRUE FALSE

4. The Grand Canyon ecosystems have not changed since the Pleistocene
   TRUE FALSE

5. Seeps and springs are important areas for plants and animals
   TRUE FALSE

6. The Grand Canyon can act as a barrier to many species
   TRUE FALSE

7. Safety is a constant concern of the trip leader
   TRUE FALSE

8. Everyone that went on the trip was a researcher
   TRUE FALSE

9. Without these expeditions valuable data about these species would be lost
   TRUE FALSE

10. The Colorado River runs through the Grand Canyon
    TRUE FALSE

11. The Sonoran River Otter is thriving in the Grand Canyon
    TRUE FALSE

12. The California Condors reintroduced near the Grand Canyon spend most of the time in Grand Canyon National Park
    TRUE FALSE

Activity - Wildlife Word Search

Circle the 10 words that relate to the wildlife at the Grand Canyon. Search down and across to find the answers.

C	A	N	Y	O	N	M	O	U	S	E	R	O
L	T	W	N	K	P	U	R	D	F	V	F	W
I	M	P	B	A	T	S	Q	E	J	H	R	L
F	I	G	J	H	C	K	B	A	V	C	A	W
F	O	M	T	Y	U	R	D	F	B	O	H	G
C	D	M	O	U	W	A	P	O	Z	N	X	L
H	F	H	J	Y	B	T	M	L	Q	D	I	Z
I	L	E	O	P	A	R	D	F	R	O	G	S
P	M	B	V	X	Z	A	G	K	P	R	Y	E
M	O	U	N	T	A	I	N	L	I	O	N	S
U	S	J	L	S	A	C	B	M	Z	T	Y	J
N	R	Y	B	E	A	V	E	R	X	B	N	P
K	Y	M	H	P	S	W	O	O	D	R	A	T

Terms

bats
beaver
canyon mouse
cliff chipmunk
condor
leopard frogs
mountain lions
muskrat
owl
woodrat

Activity - Decoding the Purpose of the Expedition

Decode the message below to learn how these expeditions help managers at Grand Canyon National Park.

9	14	22	5	14	20	15	18	25		1	14	4
13	15	14	9	20	15	18	9	14	7			
5	24	16	5	4	9	20	9	15	14	19		
16	18	15	22	9	4	5		4	1	20	1	
20	15											
18	5	19	5	1	18	3	8	5	18	19		
19	15											
20	8	5	25		3	1	14		13	1	11	5
4	5	3	9	19	9	15	14	19		15	14	
20	8	5		16	18	5	19	5	18	22	1	20
9	15	14										
1	14	4		16	18	15	20	5	3	20	9	15
14												
15	6		19	16	5	3	9	5	19	.		

Decoding Key:

A = 1	E = 5	I = 9	M = 13	Q = 17	U = 21	Y = 25
B = 2	F = 6	J = 10	N = 14	R = 18	V = 22	Z = 26
C = 3	G = 7	K = 11	O = 15	S = 19	W = 23	‘ = 27
D = 4	H = 8	L = 12	P = 16	T = 20	X = 24	

Activity - Wildlife Research

Follow the steps below to create a research project about the wildlife in the Grand Canyon. This project may require you to seek outside sources.

Materials:

pencil or pen	colored pencils or markers
glue stick	a piece of construction paper
notebook paper	wildlife books or magazines (optional)
unlined white paper	

Project Steps:

1. Select one of the Grand Canyon animals from the list below that interests you.

Canyon Mouse	Mountain Lion
Cactus Mouse	Long-tailed Pocket Mouse
White-throated Woodrat	California Condor
Mexican Long-Tongued Bat	Carpenter Bee
Leopard Frog	Sonoran River Otter
Desert Bighorn Sheep	Mexican Spotted Owl

2. Research the species using the *Views* Grand Canyon Wildlife Research Expedition. You may use outside sources (i.e. other web sites, books, magazines), however this is not a requirement.

3. Write a ½ page report on this animal on a piece of notebook paper. Include basic information about the animal, an explanation of why and how this animal is being researched in the Grand Canyon, and the results of the research. Make sure that you use proper spelling and grammar.

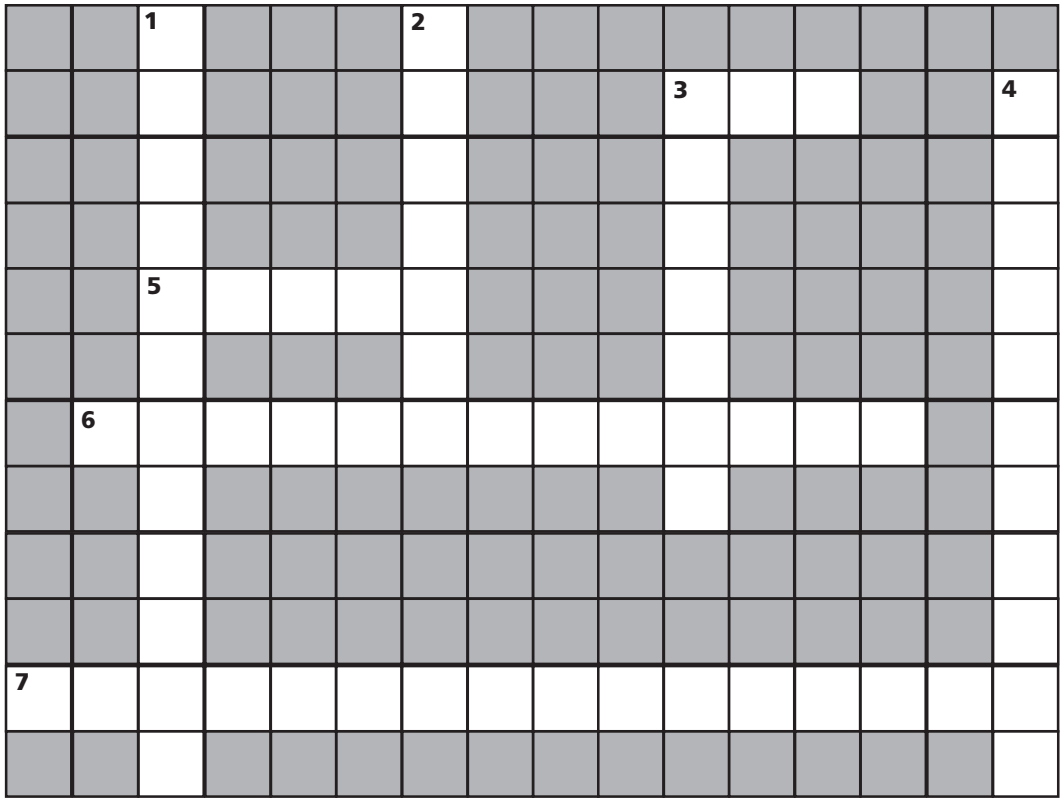
4. To make your final copy, copy the report from the notebook paper onto the top half of the unlined white paper.

5. On the bottom half of the unlined white paper, use the colored pencils or markers to draw a picture of the animal that you did your report on.

6. Make sure that the construction paper is bigger than the unlined white paper. Apply glue to back of the unlined white paper. Paste the unlined white paper to the piece of construction paper. You now have a research project on an animal from the Grand Canyon!

Activity - Expedition Crossword Puzzle

Use the clues below to complete the crossword puzzle. The clues come from the Grand Canyon wildlife research expedition.



Across

3. There are 193 different species of this invertebrate in the Grand Canyon with the possibility of over 400 being identified.
5. This animal, which can often be found in the river, is no longer present in the Grand Canyon because of humans.
6. This is the term for animals, like bats, that prey upon only on insects.
7. Use of these traps makes it possible for researchers to determine where particular species of small mammals are without hurting them.

Down

1. This animal was historically an important source of food for the natives living in and around the Grand Canyon.
2. Because of this animal and its midden, paleo-ecologists have been able to identify what lived in the Grand Canyon area during several different time periods.
3. River otters are typically found in the same areas as these animals, however they avoid competing for resources because river otters are carnivorous while these animals are herbivorous.
4. This type of mouse prefers rocky, cactus-covered slopes.

Activity - Expedition Information Fill-in-the-Blank

Use the information from the expedition of the Grand Canyon to fill in the blanks below.

Purpose

1. Preservation and _____ of species is a vital role of the National Park Service.

2. Studies are being conducted on insects, vegetation, and small _____.

Canyon Life

3. _____ forests cover the canyon rims and the Mohave Desert habitat can be found in the western reaches of the Grand Canyon.

4. Many species are no longer present in the Grand Canyon as a direct result of _____.

Logistics

5. A wildlife research expedition requires more then just a researcher and a boat. A lot of planning is involved to make sure the expedition is a _____.

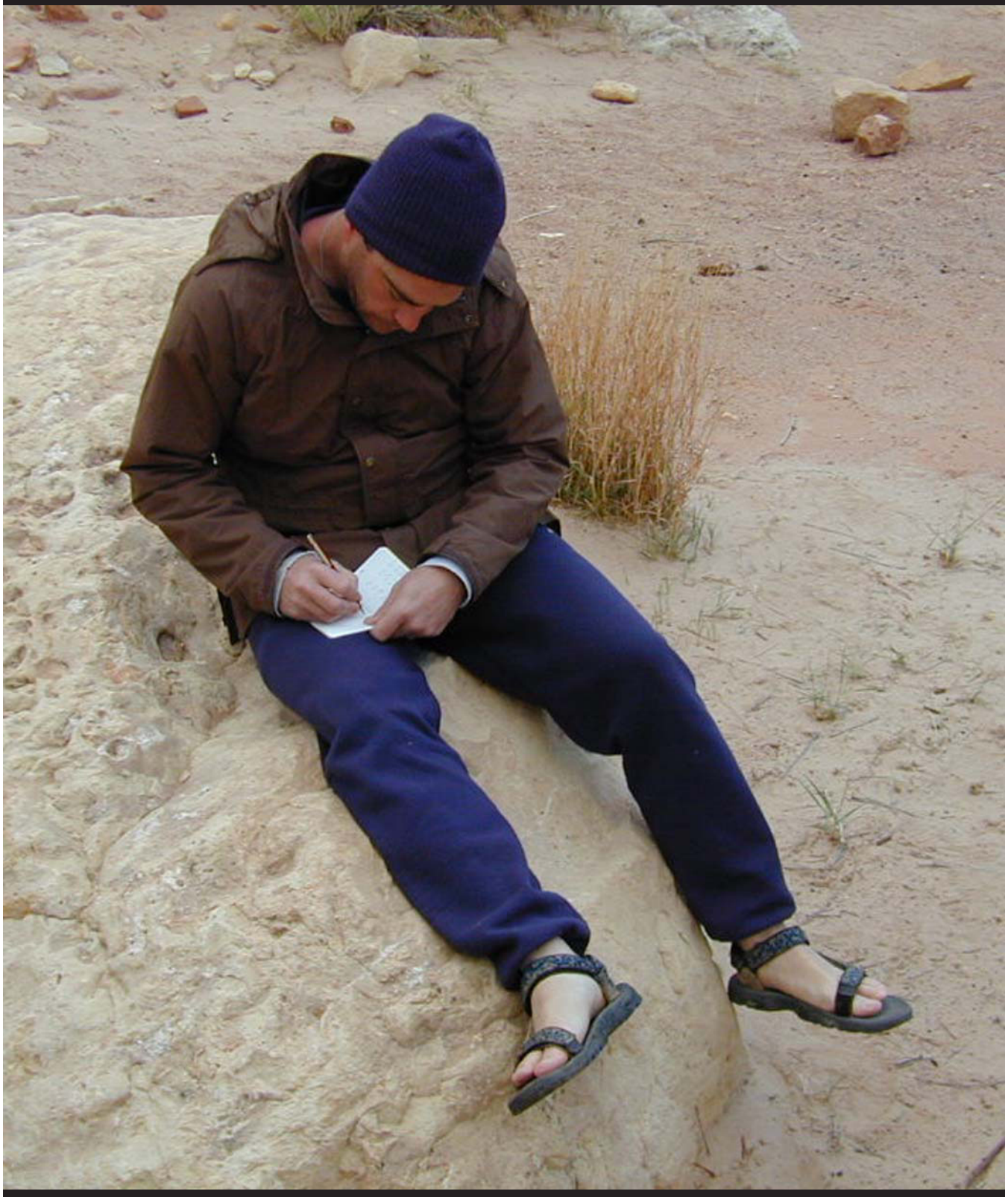
6. A key factor in determining whether or not a research project can be undertaken is the availability of _____ to fund the research.

Research

7. Most of the bat species found in Grand Canyon National Park are _____, which means they prey upon moths and other insects.

8. Bees pollinate many of the flowering species in the canyon, and _____ are an important prey base for bats, birds, amphibians, and reptiles.

Answer Keys



Notice

The answer keys for all the activities are in the full version of the Teacher Guide, located on the Teacher Resource CD. Place the CD in the drive and navigate to the following directory:

Virtual Experiences --> Grand Canyon

Open the file:

Teach_GRCA_FullVersion.pdf

If you have any trouble finding the full version, please contact us and we'll help in any way we can. Thanks!